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ABSTRACT

More than 50 college students participated in an investigation of the extent to which content area study skills programs influenced the attrition rates and grade point averages of health science students whose performance was marginal. Two experimental study skills programs were developed. In the first, 11 students were placed in a "how to study the sciences" course that lasted for one semester. While the attrition rate for this group was lower than that for a matched control group in a general survey study skills course, there was no significant difference in the grade point averages of the two groups. In the second program, 23 students were placed in a "studying the sciences" five-week minicourse. After the course, the grade point averages of these students were slightly, but not significantly, higher than their averages before the course. Overall results indicate that marginal students require more than a one-semester or half-semester study skills course. (FL)

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The Relationship Between Study Skills Reinforcement and Academic Performance of Underachieving Science Majors

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In 1974 Howard University's Board of Trustees established the Center for Academic Reinforcement (CAR). The Center is especially designed for entering freshmen in all Howard's undergraduate schools and colleges who have unrealized potential in verbal, mathematical, and learning/study skills. Since its establishment CAR has been successfully bridging the gap between high school and college for the underprepared student. During the fall semester of the 1975-76 school year, the CAR offered its services to more than 400 freshmen. Of that population approximately 20 percent were enrolled in one of Howard University's allied health science schools. Allied health science schools are the College of Pharmacy, the School of Nursing, the

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Dental Hygiene Program, and the College of Allied Health. In light of the past academic performance of most allied health science students at Howard University, the Center became very sensitive to their potential learning problems. The data of attrition for allied health science students was alarming. In some instances more than 50 percent of the students were failing to complete certain required courses. It was clear from University records that many of these students were shortening, by at least one year, their productivity as allied health science practitioners.

One objective of the CAR program is to help retain marginal students at Howard University; however, if significant numbers of non-marginal students at the University are experiencing difficulty meeting the basic requirements of the allied health science schools, then one would expect that CAR students would meet with greater academic frustration. A CAR research specialist and a study skills instructor began to hypothesize that the most effective way to alter the attrition rates of marginal students enrolled in Howard University's allied health science schools would be to implement a program andragogically based on the principles of directing the study skills of the mature student so that he can discover new dimensions in his content area science material.

Tomlinson and Tomlinson (1976) found that courses which attempted to integrate reading and study strategies with a natural science content resulted in improved science achievement. Carpenter and Jones (1976) showed that college students enrolled in special developmental courses which concentrated on the improvement of reading skills would transfer those skills

to the content area. Ambrosino, Brading, and Noval (1974) showed that academic failure in medical school is often related to deficient reading skills, and that the importance of reading skills for medical students is second to none.

The University of Kentucky's medical school offers reading and study techniques to a third of the freshmen medical students. Helm and McDonie (1974) reported that 95 percent of the freshmen medical students at the University of Kentucky felt the techniques were helpful. McClellan and McClellan (1973) suggested a reading and vocabulary mini-course to freshmen enrolled in science courses. Research shows reading and study skills services for college students majoring in the sciences is beneficial. The methods, however, for integrating them into the system is not clearly defined. So, is it reasonable to assume that a study skills mini-course will alter the academic performance of allied health science students? Will a one-semester science study skills course alter academic performance? Presently, "What exactly will help?" is the demanding question.

The problem of attrition and academic failure of science students, not surprisingly, is a problem experienced by other schools and subsequent research has been generated. Rosella (1970) found that a special reading and study skills program combined with counseling can increase the retention of high-risk students. Santensanic (1972) revealed that a college reading and study skills program (CRSS) had only a slight effect on producing significant improvement in the scholastic standing of students enrolled in the program. However, comparisons showed that students enrolled in the CRSS program will make scholastic improvement.

Harshbarger (1972) found that before Ball State University instituted its reading and study skills program, its attrition rate of high risk students had been 90 percent. However, after three years, the attrition rate of high-risk students was reduced to 48 percent. The reduction was attributed to the effect of the reading and study skills program.

Shea (1948) showed that a remedial program of reading, study skills, and counseling for high-risk students had a causative effect in upgrading students' academic achievement at a junior college in Massachusetts. Based upon admission criteria, none of the high-risk students should have succeeded; however, after one semester only 40 percent failed.

Augustine's study (1966) of persistence and attrition of engineering students at three midwestern universities found that there were significant differences between persisters and non-persisters. Non-persisters were identified as academically weak students who changed to a non-engineering major during their first and second years. The importance of this study is that it uniquely shows attrition as sometimes caused by non-academic factors. So, is it reasonable to expect that the attrition rates of high-risk students in the sciences can be halted through some type of intervention? If so, how?

During the 1976-77 school year the Center for Academic Reinforcement was awarded a Spencer Foundation Grant through the School of Education at Howard University. This grant enabled the Center to offer a variety of needed collateral services to Howard University's undergraduate allied health science schools and colleges and to determine the effectiveness of these services and the andragogical principles upon which they are based. During the fall of 1976 and the spring of 1977 a research study was conducted in

order to determine the most productive type of Learning/Study Skills course(s) for certain science majors.

The purpose of the Spencer Foundation study and of the subsequent research conducted with the collateral services was to produce empirical data which would help answer the following research questions:

1. Will a tailor-made learning to learn course, "How to Study in the Sciences," be more effective in reducing the attrition rate and in raising academic performance of marginal students attending Howard University's allied health science schools than the general survey study skills course offered to marginal students?

2. Will there be a significant difference in fall 1976 and spring 1977 grade point averages of science students voluntarily enrolled in a "Studying the Sciences" mini-course offered in the spring 1977 semester?

METHOD/STUDY ONE

Population

During the fall 1976 semester the CAR offered a special study skills/reading course to marginal freshmen who were enrolled in one of the undergraduate allied health science schools at Howard University. Thirteen CAR students enrolled in the tailor made Learning to Learn course which lasted for one semester. Of those original 13 students only two students failed to complete the course. The remaining 11 CAR students were compared to a matched control group of CAR students who had been exposed to the regular CAR Learning course. The experimental students' science grade point averages and persistence (persistence to remain in college) were compared to the control group's science grade point averages and persistence to judge the effectiveness of the tailor-made course.

Treatments

The uniqueness of the experimental treatment was that classroom instruction was designed specifically for helping science majors learn how to study and read scientific material. Four instructional topics in the science study skills/reading course were covered: college life, science study skills, science reading skills, and proper scientific attitudes. The topic, college life, was designed to help the student identify and deal with obstacles, academic and non-academic, which perhaps threaten academic survival at Howard University. The science reading skills part demonstrated the uses of a variety of textbook reading techniques, SQ4R and PAR4, and their use for college science textbooks. Emphasis was placed on the importance of understanding graphs, charts, tables and diagrams as study aids in college science textbooks. Discussion also centered around the classification and analysis of various writing patterns commonly used in science texts (classification, process description, factual statement, problem solving, experiment-instruction). Some of the issues or instructional topics covered under science study skills helped the student with the following:

1. classifying and identifying skills necessary for academic success in the sciences
2. assessing the adequacy of present science study behavior
3. practicing listening and notetaking skills in science lecture settings
4. producing increased scores on hypothetical objective tests in the sciences.

Finally, brief attention was given to the importance of developing attitudes which facilitated academic survival in the science fields.

RESULTS

A comparison of science grades received by the experimental group and the control group during the first semester reveals that the science grade point averages (sgpa) of the experimental group was slightly higher than the sgpa of the control group. The experimental group also received a lower percentage of F-grades compared to the control group; however, there is no significant statistical difference between the science grade point averages of the two groups ($t=0.06$; $p>.05$).

The overall grade point average (all courses) for the experimental group was $\bar{x}=1.91$, $sd=0.93$ ($n=11$) and for the control group the overall grade point average was $\bar{x}=1.83$, $sd=0.99$ ($n=11$). There is no significant difference between the two groups' overall grade point average ($t=0.19$; $p>.05$). Although the attrition rate of the experimental students was lower than the attrition rate of the control students, the difference was minimal.

Is there a significant difference between the academic achievement of students receiving satisfactory grades in Learning to Learn and students receiving unsatisfactory grades in general? The mean grade point average for students receiving satisfactory grades in Learning to Learn is $\bar{x}=2.37$, $sd=0.59$ ($n=7$). The mean grade point average for students receiving unsatisfactory grades in Learning to Learn is $\bar{x}=0.99$, $sd=0.82$ ($n=4$). The t-test for uncorrelated samples reveals that there is a significant difference between the academic achievement of these two subgroups ($t=3.01$; $p<.05$).

METHOD/STUDY TWO

Population

Studying in the Sciences Mini-Course was a high intensity, 5-week academic reinforcement mini-course for students majoring in the sciences. Twenty-eight students began the course, and twenty-three remained to complete it. The twenty-three students who remained represented various majors; zoology, chemistry, pharmacy, engineering, physical therapy, pre-dentistry, and medical technology. The diverse majors did not inhibit individual attention because many assignments and lessons were independently focused on each student's course work.

Treatment

Like the Learning to Learn experimental science course, the mini-course was designed to help science majors learn how to study and read the sciences. The major course work involved the following topics:

1. reading science textbooks with greater ease by enhancing the skills of underlining, reading rate, comprehension, and vocabulary
2. taking more efficient textbook and lecture notes
3. becoming test-wise by means of critical reading skills, organized review, and personal test analyses.

The course was specifically designed for an intense five-week period. No outside work was given which did not directly influence content area study habits at that specific time. For example underlining techniques were taught in class and then practiced on each individual student's reading assignment for that week; likewise, notetaking techniques were taught and then practiced on that week's lecture. In the test-wiseness section, past standardized and

teacher made tests were scrutinized, teacher/student test conferences were encouraged, and secondary test cues were explained and examined for purposes of enhancing the next testing experience. This approach was thought to be advantageous to all participating students, whether their motives for joining the mini-course were that they were borderline students in need of academic help and guidance or that they were highly self-motivated students.

The researchers evaluated the effectiveness of this portion of the project by comparing the first and second semester gpa's and by comparing marks on pre and post tests of underlining for reading comprehension purposes.

RESULTS

Will a tailor-made, science, study skills mini-course influence students' gpa's? The mean gpa for the semester before the students enrolled in the Science Study Skills Mini-Course was 2.31. The mean gpa for the semester during the students' enrollment increased to 2.60. The data reveals that science majors experiencing a high intensity, time compressed science mini-course in study skills improve academically, although not significantly. Viewing the data in terms of percentages, 65.2 percent of the subjects showed a rise in gpa scores and only 35.8 percent showed a decrease.

Can teaching the study skills technique of underlining improve students' techniques as measured by a pre and post-test? There was a significant difference between the pre and the post tests of underlining at the .05 level. The pre-test mean was 60.87, and the post-test mean was 78.26. In 65.2 percent of the cases, subjects increased scores from the pre to the post-test; the scores remained the same 21.7 percent of the time; and scores dropped 13.1 percent of the time.

CONCLUSIONS

The major conclusions resulting from this study are as follows:

1. There was a significant difference between the academic achievement of students who received satisfactory (S) grades in a learning-to learn course and students who received unsatisfactory (U) grades in it. The significance was in favor of students receiving the S-grades.

2. There was no significant difference between the science grades of the experimental subjects taking the science learning-to-learn course and of the control subjects taking the standard course.

3. The tailor-made learning-to-learn course, "How to Study the Sciences," was more effective in reducing the attrition rate of marginal students attending Howard University's allied health science schools than a general survey study skills course offered to marginal students.

4. There was a significant difference between a pre and a post-test on underlining when instruction is given in the study skills.

5. A science study skills mini-course elected by students majoring in the sciences increased gpa slightly (in one semester) but not significantly.

DISCUSSION AND IMPLICATIONS

The Science Study Skills Mini-Course was offered to all students on Howard University campus, not only CAR students. Students elected to take the course and there was no credit attached to the work given. The students' mean gpa rose slightly though not significantly. Students were very much interested in their field as well as in the mini-course itself as evidenced by the favorable remarks on evaluations at the end of the course:

"Extremely helpful. I wish it were longer."

"I was looking for a course to improve my study skills so that I could be successful in college. This has helped me a lot.

"I wish it were longer so I could learn more about test-taking."

"This should be recommended to all science majors."

The experimental group's gpa's rose 68.2 percent of the time--a definite plus factor; but the difference in the control and experimental groups' gpa's were, nevertheless, statistically insignificant. This seems to indicate that perhaps the mean gpa of the semester during the mini-course did not give an accurate indication of its influence, and the study should be extended over a longer period of time in order to scrutinize the mean gpa in the semesters following the mini-course.

There was evidence of students achieving prowess in the skill of underlining. It is interesting to note that 60.87 percent of the time when students' gpa's went up, so too did the scores of the underlining post test; and when the gpa's went down, so too did the underlining post-test scores. This seems to be a good area for future study. Notetaking, listening, concentration, and test-taking skills could be correlated in the same manner.

Will a tailor-made learning to learn course, "How to Study the Sciences," be more effective in reducing the attrition rate and raising academic performance of marginal students attending Howard's allied health science schools than a general study skills course offered to marginal students?

There is very little immediate difference between the academic performance and attrition rate of students participating in the study skills course tailor-made to the sciences and the regular study skills couse. It would be interesting to determine the long range effects of such courses. An academic semester running concurrently to developmental classes is not a reasonable amount of time for substantial results, however, those who pass either study skills course

have significantly better gpa's than those who do not pass. Those who pass average a C+ grade which is certainly not outstanding and implies that learning problems are still experienced. This is understandable since the skills taught at the end of the semester in study skills may not help the experiences in deficient areas at the beginning of the first semester in college.

But whether it is understandable or not, the present evidence indicates that there should be a follow-up of developmental experience. Initially exposing high risk students to a transitional studies course of this nature is vital, but so too is a continued experience as a measure of security. The gap between the academic defficiencies of the CAR students prior to college entrance and the academic prowress demanded by the allied health sciences is wide, and an extraordinary approach must be taken because of this gap.

One suggestion is that the faculty of the allied health science schools should participate in in-service classes conducted by reading and study skills instructors. The content of the classes should include methods for teaching content subjects with a study skills approach. The material should not be "watered down," but the teaching approach should be modified to accommodate those students with untapped academic potential in the science fields.

Something much more comprehensive than a one semester special or regular study skills course needs to be offered to allied health science students at Howard University. The verbal, mathematics, and study skills courses at the CAR are vitally necessary since they cover the skills basic to success in college, but assistance is needed beyond the freshman year. A program is

needed which is more comprehensive and goes beyond the freshman year. The purpose of the CAR is to increase student achievement, and the extended purpose of such an extended program would serve as a follow-up to insure student achievement in the allied health sciences. Also, CAR has as a purpose to increase student retention at Howard University, and the purpose of such an extended program would be to insure student retention in the allied health program. If Howard University is committed to retaining marginal students entering the undergraduate allied health science schools, then it must be willing to support academic programs which continue where the CAR leaves off. Howard University has already taken the first step; however, now is the time to step again in the direction of new programs extending beyond the freshman year and those which involve in-service classes for faculty. Without these kinds of academic supports, marginal academic students entering Howard's undergraduate allied health science schools will find nothing but academic frustration at the university level.

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PROGRAM ABSTRACT

TITLE: The Relationship Between Study Skills Reinforcement and Academic Performance of Underachieving Science Majors

What is the most effective way to alter the attrition rates for marginal or "high-risk" students enrolled in allied health science schools? The extend to which a study skills program influenced the attrition rates and science students' GPA's was investigated. Subjects were fifty-four (54) college students exposed to one of two experimental study skills programs. The first experimental condition, "How to Study the Sciences," was more effective in reducing the attrition rate of marginal studnets than a general survey study skills course offered to marginal students. There was, however, no significant difference between the science grades of experimental subjects taking the "How to Study the Sciences" course and the control subjects. The second experimental condition, "Studying in the Sciences Mini-Course" increased experimental students GPA's slightly but not significantly. The overall results indicate that more assistance than a one semester or half a semester tailor-made study skills course is needed. Recommendations were made for an instructor in-service project which would be part of a learning assistance program integrated with the regular university curriculum.

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